

REMARKS

The communication accompanies a request for continued examination. Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

By the present amendment, claims 34, 42, and 45 are cancelled and claim 31 is amended to correct a typographical redundancy. Claims 47-51 are newly added. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier. Support for the amended and new claims can be found throughout the application and claims as originally filed. After amending the claims as set forth above, claims 24, 30-33, 35-37, 44 and 47-51 will be pending in this application.

As an initial matter, Applicants thank Examiner Goloboy for withdrawing the previous grounds for rejection. Applicants respectfully traverse the new rejections for the following reasons.

Claims 24, 30, 25, 42, and 44

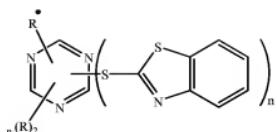
Claims 24, 30, 35, 42, and 44 stand rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. 6,025,306, issued to Erdemir, in view of U.S. 5,433,873, issued to Camezind. Applicants assert that Camezind and Erdemir actually teach away from the Examiner's proposed combination, and as such, Applicants respectfully traverse this rejection.

The presently claimed invention is a method of providing lubricity in a forming or machining fluid. The method includes mixing a nanoparticle-sized particulate of boric acid into a forming or machining fluid that is an n-alcohol, polyalkyleneglycol, polyvinyl alcohol, glycerol, or a combination of any two or more thereof. Such forming and machining fluids have been shown to be environmentally benign, non-flammable, non-toxic, and are readily cleaned from machined parts and workers hands.

Erdemir is directed, in part, to the preparation of lubricating compositions of metal containing boric acid in a non-aqueous lubricant. *See* col. 2, lines 6-17. Such lubricants are exemplified to be any of a number of oils or greases. *Id.* The lubricants of Erdemir are those that are typically used in machines and engines to prolong the life of the machine components and reduce wear. *See* col. 1, lines 20-30. The boric acid is present at a size of from 0.1 to 40 microns. Col. 2, line 22. The boric acid in the oils and greases of Erdemir is intended to remain as a stable dispersion. Stable dispersion is defined by Erdemir as “a mixture in which solid lubricating particles [*i.e.* crystalline boric acid] remain as separate, discrete particles in the presence of a stabilizer and a carrier fluid medium.” Col. 4, lines 31-34.

Applicants note that the Examiner’s interpretation of language in Erdemir referring to a “concentrate” as implying solution of boric acid does not appear to be a correct interpretation. Erdemir discusses at length that the boric acid needs to remain a crystalline solid in order to exhibit the lubricating properties: “undesirable reactions can include destruction or substantial disturbance of the layered crystal structure of boric acid.” Col. 3, lines 58-60. The term “concentrate” is actually used by Erdemir to describe the stable dispersions of solid particles in the dispersion, but at a concentrated level for addition to an oil or grease lubricant for lubricating a machine or engine part. It does not refer to dissolution of boric acid. In fact, Example 2, teaches that when boric acid is dissolved in water, added to an oil or grease, and then the water removed, an undesirable amorphous boric acid in the grease results. *See* col. 6, line 60- col. 7, line 27.

Camezind is directed to the preparation and use of lubricants that are *metal- and phosphorus-free*. *See* col. 1, lines 63-66. In order to achieve lubrication where others have used metal or phosphorous as a lubricant, Camezind uses a triazole compound of formula I:



As the base lubricant to which the triazole compounds are added, Camezind uses a wide variety of both natural and synthetic oils and other lubricants. Col. 3, line 43 – col. 4, line 24.

Applicants submit that Erdemir and Camezind mutually teach away from their combination. The driving force behind the lubricant compositions of Camezind is the preparation of metal- and phosphorus-free lubricants. Conversely, Erdemir specifically adds a metal (*i.e.* boric acid) to the lubricants. Because Camezind is actually teaching a new composition to avoid the compositions of Erdemir, there cannot be any reason that one of skill in the art would use the lubricants of Camezind in the compositions of Erdemir.

Applicants also point out that the oils and greases of Erdemir are well known machine and engine lubricants in the art. Just as well known is the fact that such oils and greases are persistent and are not environmentally friendly or readily washed from surfaces, including hands. Conversely, a number of the stated properties of the forming and machining fluids of the presently claimed methods are that the materials are environmentally benign and that they are readily removed from surfaces such as the formed or machined parts and worker's hands. There is no teaching or suggestion of such features in Erdemir and the person of ordinary skill in the art would not be motivated to prepare the fluids of the presently claimed methods, based upon the teachings of Erdemir.

With separate regard to claim 30, Erdemir actually teaches away from the dissolution of the boric acid. As described above, Erdemir is specifically directed to the addition of boric acid to compositions in which the boric acid will not dissolve (*i.e.* it will remain as a stable dispersion). To illustrate that the boric acid must remain crystalline in the grease, Erdemir dissolves boric acid in an aqueous solution, adds it to a grease, then removes the water from the mixture. *See Example 2, col. 6, line 60 – col. 7, line 34.* The Raman spectrum of this grease/boric acid mixture contains an amorphous boric acid material. *Id.* In contrast, a boric acid/grease mixture, prepared according to Erdemir's invention, provided Raman spectrum indicative of crystalline boric acid. *Id.* Because Erdemir is comparing and contrasting the invention requiring crystalline boric acid in a grease to compositions without crystalline boric

acid, Erdemir actually teaches away from the dissolution of the boric acid in a solvent prior to mixing with the forming or machining fluid.

In summary, Erdemir is directed to oils and greases containing boric acid , however such oils and greases are those as typically used in moving machine and engine components for reducing wear thereby prolonging life of the components. The oils and greases of Erdemir are metal-containing materials. There simply is no teaching or suggestion of the present method of providing lubricity to forming or machining fluids, especially those with the described properties including environmental friendliness and ready removal from formed or machined parts and also hands of workers. Camezind does not fill the gap to provide methods of providing lubricity in a forming and machining fluid, because Camezind actually teaches that oils and greases *without metal or phosphorus* are desirably and that metals should be eliminated. The person of ordinary skill in the art is then left with two very disparate references that are not combinable due to the mutual teaching away by each reference for combination with the other.

As such, Applicants respectfully request withdrawal of the pending rejections based upon Erdemir and Camezind, and request that the application be allowed to proceed to issuance.

Claim 31

Claim 31 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Erdemir in view of Camezind, and further in view of U.S. 4,330,419, issued to Hall *et al*. Applicants respectfully traverse this rejection.

As shown above for the combination of Erdemir and Camezind with respect to claims 24, 30, 25, 42, and 44, the person of ordinary skill in the art is bereft of any reason to combine the two references when Camezind teaches that metal incorporation in a lubricant is to be avoided, and Erdemir teaches that metal containing compounds such as boron should be included in a lubricant. Applicants submit that Hall fails to bridge this gap.

Hall is directed to compositions that are capable of dissolving fluoride deposits from subterranean drilling equipment. *See col. 1, lines 5-8.* The compositions dissolve boric acid in

methanol and hydrochloric acid, the resulting mixture then being added to water to complete the fluoride dissolving solution. The fluoride dissolving solution is then contacted with the parts and then heated until an appreciable amount of the fluoride deposit, or scale, is dissolved. *See col. 2, lines 34-62.*

Hall fails to discuss or provide any discussion of lubricants or lubricity of metal forming or machining fluids. Hall fails to discuss or provide any discussion of boric acid that is nanoparticulate. Hall fails to provide any reasons to one of skill in the art to use boric acid in a carrier to provide lubricity to a metal forming or machining fluid.

Hall is merely relied upon by the Examiner for exemplification that boric acid is capable of dissolving in methanol. Other than this exemplification, Hall does not provide the person of ordinary skill in the art with any other teaching or suggestion of the claimed invention, or provide any connection to either Erdemir or Camezind. Hall, Erdemir, and Camezind all fail to provide a reason to the person of ordinary skill in the art to provide lubricity to a forming or machining fluid using boric acid that is dissolved in a solvent prior to mixing with the forming or machining fluid.

Applicants submit that in view of the failed combination of Erdemir and Camezind, Hall fails to provide the person of ordinary skill in the art with any motivation or instruction to practice the claimed methods and provide lubricity to a forming or machining fluid. As such, Applicants respectfully request withdrawal of the rejection and that the application be allowed to proceed to issuance.

Claims 32, 33, 36, and 37

Claims 32, 33, 36, and 37 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Erdemir in view of Camezind, and further in view of U.S. 3,974,674, issued to Orozco *et al.* Applicants respectfully traverse this rejection.

As shown above for the combination of Erdemir and Camezind, the person of ordinary skill in the art is bereft of any reason to combine the two references when Camezind teaches that

metal incorporation in a lubricant is to be avoided, and Erdemir teaches that metal compounds such as boric acid should be included in the lubricant. Applicants submit that Orozco fails to bridge this gap.

Orozco teaches the use of dry films, substantially free of water, for draw forming of metal. Col 1, lines 43-58. The dry films of Orozco are prepared from “a high-titre soap...a suitable plasticizer for the soap, a viscosity stabilizer..., two water soluble polymeric materials capable of condensing with each other and forming cross links upon drying of the coating, and a water soluble glass-forming pigment such as borax...” Col. 3, lines 20-29. There is no teaching or discussion of boric acid, or a particulate size for boric acid in Orozco.

To combine Orozco with Erdemir leaves the person of ordinary skill in the art with a composition of an oil or grease with a crystalline boric acid for spray coating. However, the oil or grease will not dry to the dry film that Orozco is intended to produce, and crystalline boric acid will be present and not dissolved in the oil or grease. There can be no expectation of success that an oil or grease could even be spray-coated for a metal forming or machining process.

To combine Orozco with Camezind fails to provide any formulation containing boric acid, in fact, by the express teachings of Camezind, the composition would be metal-free.

The Examiner has shown that Erdemir and Camezind fail to teach or suggest alone the presently claimed methods. Applicants submit that the combination of Erdemir and Camezind also fails due to mutual teaching away of the references. Finally, Applicants submit that Orozco does not overcome the deficiencies of Erdemir and Camezind. As such, Applicants respectfully request that the rejection be withdrawn and that the application be allowed to proceed to issuance.

Claims 24 and 34

Claims 24 and 34 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Erdemir in view of SU 1810383, issued to Klyuchnikov, and Orozco. Applicants respectfully traverse this rejection.

Erdemir and Orozco are both addressed above: Erdemir is directed to oil and grease compositions where boric acid is added, and remains, a solid, and Erdemir fails to teach or suggest the presently claimed forming or machining fluids; and Orozco is directed to the use of dry films with borax, substantially free of water, for draw forming of metal and fails to teach or suggest the presently claimed forming or machining fluids or the use of boric acid. To fill the gaps and provide a forming or machining fluid that includes an alcohol, the Examiner turns to Klyuchnikov. However, Applicants submit that the compositions of Klyuchnikov are complete in and of themselves and there is no motivation to combine with either Erdemir or Orozco and any such suggestion of combination could only come from hindsight reconstruction based upon the present application.

Klyuchnikov is directed to compositions for improving the stability of cutting tools. The compositions include 1,1,1-trichloro-2-methylpropanol semihydrate, tetrabutylammonium bromide, ethylene glycol, and ethanol. [Separately, Applicants point out that the mention of “methanol” appears to be a typographical error in the translation provided by the Examiner, as the composition includes “ethanol,” not “methanol.”] There are no other additives discussed. There is no discussion of the use of boric acid. There is no discussion of the use of the compositions in oils or greases.

Absent the present application, the person of ordinary skill in the art is bereft of any reason to combine Klyuchnikov with either Erdemir or Orozco. Klyuchnikov states that it is the exemplified composition that improves the stability of a cutting tool. There is no suggestion that boric acid will add any benefit at all, or that there is any expectation of success in using the compositions with boric acid. As illustrated by Hall, alcohols dissolve boric acid and the mere teaching in Klyuchnikov that ethanol could be used in a lubricant or cutting tool, does not

provide the person of ordinary skill in the art with the motivation to combine the Klyuchnikov compositions with boric acid to provide additional lubricity based upon the teachings of Erdemir which requires the boric acid to remain a crystalline solid. As such, Applicants respectfully request that the rejection be withdrawn and that the application be allowed to proceed to issuance.

Claim 45

Claim 45 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Erdemir in view of U.S. 5,209,860, issued to Trivett *et al.* In view of the cancellation of claim 45, Applicants respectfully request withdrawal of the rejection.

CONCLUSIONS

For the reasons provided above, none of the cited references, alone or in combination, either fail to teach or suggest each and every element of the claimed invention, or the express teachings in the references counsel the person of ordinary skill in the art away from their combination. As such, Applicants submit that each of the rejections under 35 U.S.C. § 103(a) has been overcome. Applicants respectfully request that the Examiner withdraw the remaining rejections and allow the application to move forward to issuance.

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested. The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

Respectfully submitted,

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